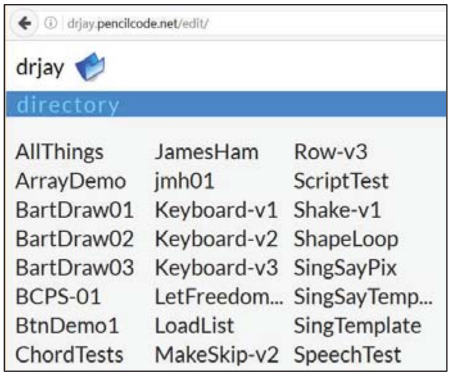
Teaching a Computer to Sing

University of Massachusetts Lowell
Bartlett Community Partnership School

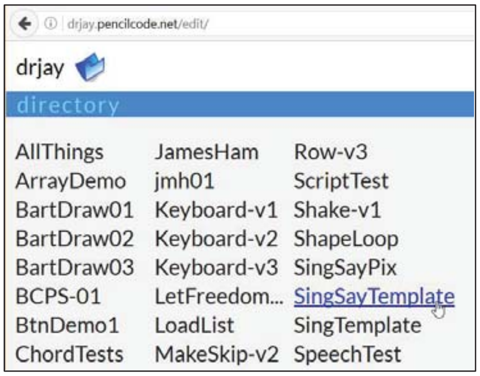
Using the SingSay Template

1. Open your browser and go type **`drjay.pencilcode.net`** in the address field. When that page opens you will see a list of programs written by Jesse.



AllThings
ArrayDemo
BartDraw01
BartDraw02
BartDraw03
BCPS-01
BtnDemo1
ChordTests
JamesHam
jmh01
Keyboard-v1
Keyboard-v2
Keyboard-v3
LetFreedom...
LoadList
MakeSkip-v2
Row-v3
ScriptTest
Shake-v1
ShapeLoop
SingSayPix
SingSayTemp...
SingTemplate
SpeechTest

2. Click **`SingSayTemplate`**. This will open the **`SingSay`** template program.



AllThings
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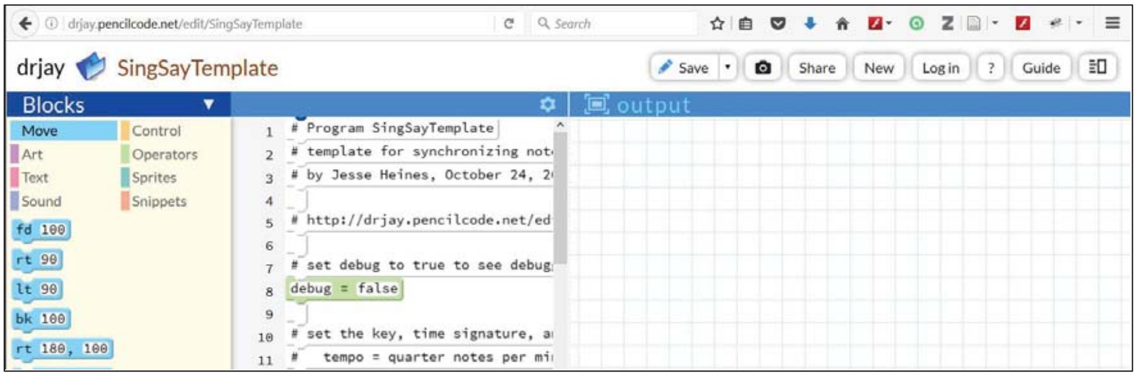
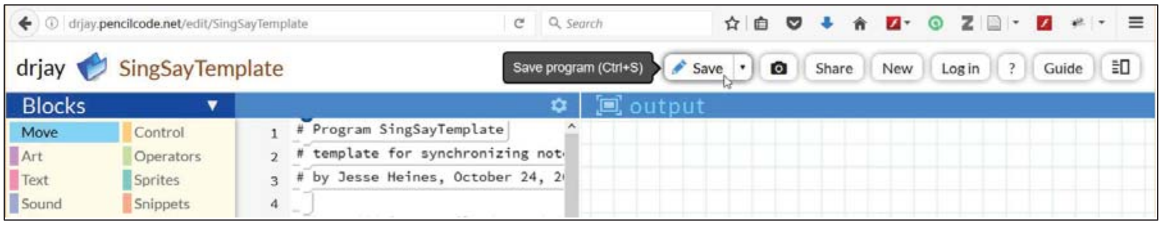


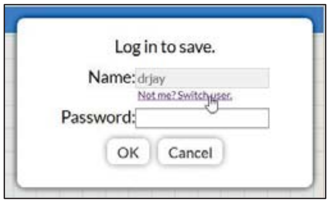
```
# Program SingSayTemplate
# template for synchronizing not
# by Jesse Heines, October 24, 2

# http://drjay.pencilcode.net/ed

# set debug to true to see debug
debug = false

# set the key, time signature, a
#   tempo = quarter notes per mi
```

3. With the **SingSayTemplate** open, click the **Save** button.



```
# Program SingSayTemplate
# template for synchronizing not
# by Jesse Heines, October 24, 2
```

4. A dialog box named **Log in to save.** will pop up. Under **Name: drjay** click **Not me? Switch user.**

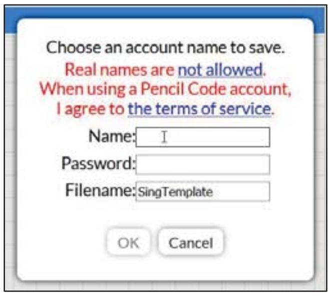

Log in to save.

Name: drjay

Not me? Switch user.

Password:

5. The dialog box will change to **Choose an account name to save.**


Choose an account name to save.

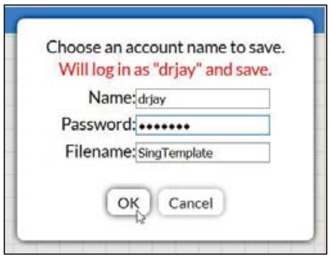
Real names are not allowed.
When using a Pencil Code account,
I agree to the terms of service.

Name:

Password:

Filename: SingTemplate

6. Enter your own name and password and click the **OK** button. This saves the template to your own account.


Choose an account name to save.

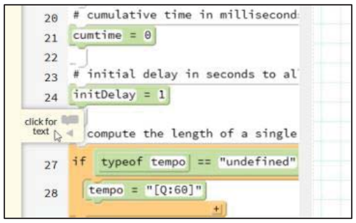
Will log in as "drjay" and save.

Name: drjay

Password: •••••••

Filename: SingTemplate

7. Click the **click for text** button. This provides access the full text of the program.



```
# cumulative time in millisecond
cumtime = 0

# initial delay in seconds to al
initDelay = 1

compute the length of a single
if typeof tempo == "undefined"
  tempo = "[Q:60]"
```

```
# Program SingSayTemplate
# template for synchronizing notes and lyrics
# by Jesse Heines, October 24, 2016

# http://drjay.pencilcode.net/edit/SingSayTemplate

# set debug to true to see debugging information
debug = false

# set the key, time signature, and tempo
#   tempo = quarter notes per minute
key='[K:C]'       # SET TO YOUR KEY
time='[M:4/4]'    # SET TO YOUR METER
tempo='[Q:120]'   # SET TO YOUR TEMPO

# combine key, time, and tempo into a variable
#   named prefix simply for convenience
prefix=time+key+tempo

# cumulative time in milliseconds
cumtime = 0

# initial delay in seconds to allow pianos to display
initDelay = 1

# compute the length of a single beat
if typeof tempo == "undefined"
  tempo = "[Q:60]"
beatlength = /^\[Q:(\d+)\]$/.exec tempo
beatlength = 1000*60/(parseInt beatlength[1])
if debug then write "1 beat = " + beatlength + " ms"

# function to delay for a number of seconds
# call this function  to allow the pianos to be displayed and
#   positioned before starting the music
delay = ( seconds ) ->
  pause seconds
  cumtime += 1000*seconds

# initialize up to 6 pianos to play each part
nPianos = 2   # SET THIS TO THE NUMBER OF PIANOS YOU WANT
pianos=[]
for p in [1..nPianos]
  pianos[p]=new Piano
  pianos[p].fd (0.5*nPianos+0.5-p)*150
# declare that all pianos are to be synced
sync pianos[1],pianos[2],pianos[3],pianos[4],pianos[5],pianos[6]
# wait for the pianos to be displayed and positioned
delay 1

# define a function for convenience, to which
# we can pass which piano to play (p) and the
# notes to play on that piano
sing = (p, notes) ->
  pianos[p].play prefix+notes

# reference for the following code:
# http://stackoverflow.com/questions/6459630/
#   how-to-write-settimeout-with-params-by-coffeescript

# auxiliary function called by setTimeout
# nPiano = number of piano on which to play notes
# notes = the notes to be played for this phrase
# lyrics = the words to print for this phrase
# note: to start a new line of lyrics, start the line with |
singsayaux = ( nPiano, note, lyrics ) ->
  sing nPiano, note
  if lyrics.substr(0,1) == "|"
    write ""
    append lyrics.substr(1)
  else
    append lyrics

# function to both sing and display lyrics
# seconds = number of seconds to delay since playing the last phrase
# nPiano = number of piano on which to display notes
# notes = the notes to be played for this phrase
# lyrics = the words to print for this phrase
# note: to start a new line of lyrics, start the line with |
singsay = ( nPiano, note, lyrics ) ->
  if true
    callback = -> singsayaux nPiano, note, lyrics
    setTimeout callback, cumtime
  durations = /^[\^_=]*[A-Ga-gZz][',]*((\d*)(\/?)(\d*))$/.exec note
  if debug
    append "|" + durations[2] + "| &nbsp; |" + durations[3]
    append "| &nbsp; |" + durations[4] + "|"
  if debug then append note
  if durations == null
    write "Error: duration for note \"" + note + "\" is null"
  else
    noteduration = durations[1]
    if noteduration == ""
      milliseconds = beatlength
      if debug then append "&nbsp; = " + beatlength + " ms"
    else if noteduration == "/"
      milliseconds = beatlength/2
      if debug then append "&nbsp; = " + beatlength/2 + " ms"
    else
      durations[2] = 1 if durations[2] == ""
      durations[4] = 1 if durations[4] == ""
      if debug
        append "&nbsp; => &nbsp; |" + durations[2]
        append "| &nbsp; |" + durations[4] + "|"
      milliseconds = beatlength * parseInt(durations[2]) / parseInt(durations[4])
      if debug then append "&nbsp; = " + milliseconds + " ms"
  cumtime += milliseconds
  if debug then append " => " + cumtime
  if debug then write ""

# coded notes and lyrics - REPLACE WITH YOUR OWN CODE
singsay 1, "C", "do(low)"
singsay 1, "D", " re"
singsay 1, "E2", " mi"
singsay 1, "F", " fa"
singsay 1, "G", " sol"
singsay 1, "A2", " la"
singsay 1, "B", " ti"
singsay 1, "C'", " do(high)"
```

8. You can now edit the text as follows.

   a. If necessary, replace the C key letter in line 12 with the key letter of your song.

   ```
   12  key='[K:C]'       # SET TO YOUR KEY
   ```

   b. If necessary, replace the 4/4 time signature (meter) in line 13 with the time signature of your song.

   ```
   13  time='[M:4/4]'    # SET TO YOUR METER
   ```

   c. If necessary, replace the 120 beats per minute tempo in line 14 with the tempo of your song.

   ```
   14  tempo='[Q:120]'   # SET TO YOUR TEMPO
   ```

   d. If necessary, replace 3 in line 18 with the number of pianos (parts) that your song needs.

   ```
   41  nPianos = 1       # SET THIS TO THE NUMBER OF PIANOS YOU WANT
   ```

   e. Starting at line 112, replace the sample **`singsay`** lines with the notes and lyrics that you want to play on each piano in your program.

   ```
   111  # coded notes and lyrics - REPLACE WITH YOUR OWN CODE
   112  singsay 1, "C", "do(low)"
   113  singsay 1, "D", " re"
   114  singsay 1, "E2", " mi"
   115  singsay 1, "F", " fa"
   116  singsay 1, "G", " sol"
   117  singsay 1, "A2", " la"
   118  singsay 1, "B", " ti"
   119  singsay 1, "C'", " do(high)"
   ```

   You may add as many **`singsay`** lines as you like, but they must all follow this pattern:

   `singsay` *piano number*`,` "*note letter*"`,` "*lyric*"

   - The first word must be **`singsay`**.
     - (This calls the **`singsay`** function defined at line 80.)
     - **`singsay`** must be followed by a space (press the space bar).
   - Next, type the number of the piano you want to use.
     - Follow that with a comma (`,`) and a space.
   - Next, type the ***single note*** to be played, inside double quotes (").
     - ***Important:*** You may only put ***one note*** inside the double quotes. The note may include the number of beats it is to play (such as `A2` or `B/4`), but only one note is allowed.
     - Again, follow that with a comma (`,`) and a space.
   - Finally, type the word (lyric) to display when the note is played, again inside double quotes (").

   There are two tricks available to help make your lyrics look right on the screen.

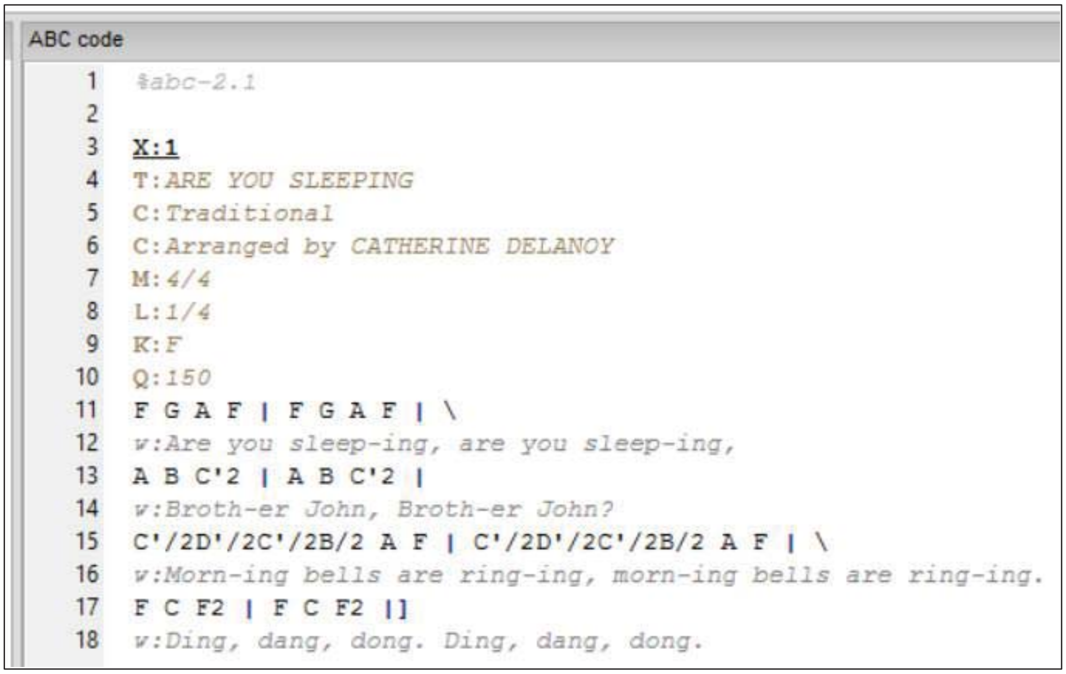
   - To separate words, add a space either before or after each word to be displayed.

- To force a line break, that is, to get a word to start on a new line, put a vertical bar (`|`) before the word, like this: `"|word"`.

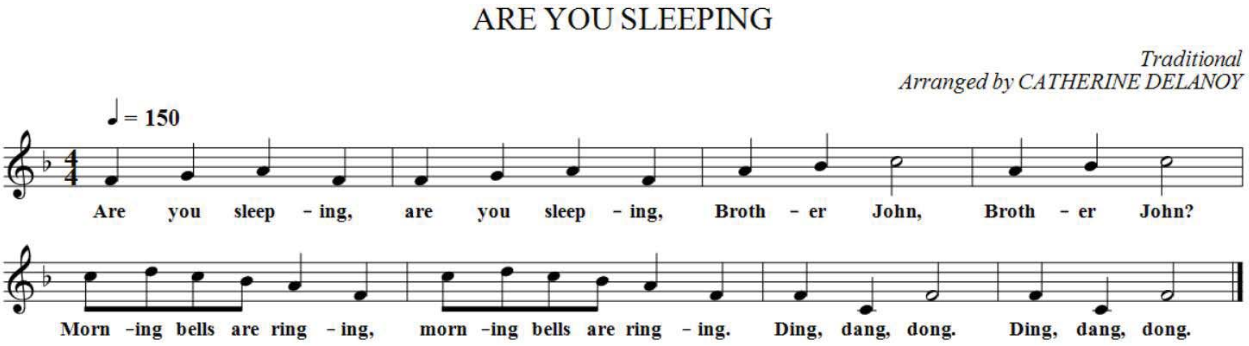
Remember that each piano (part) in your program is *independent*. That is, all the pianos (parts) will play at the same time. If you want one part to start before another, you must add rests to delay the second part.

Do not change any other code in the `SingSay` template.
Doing so will prevent it from working properly.

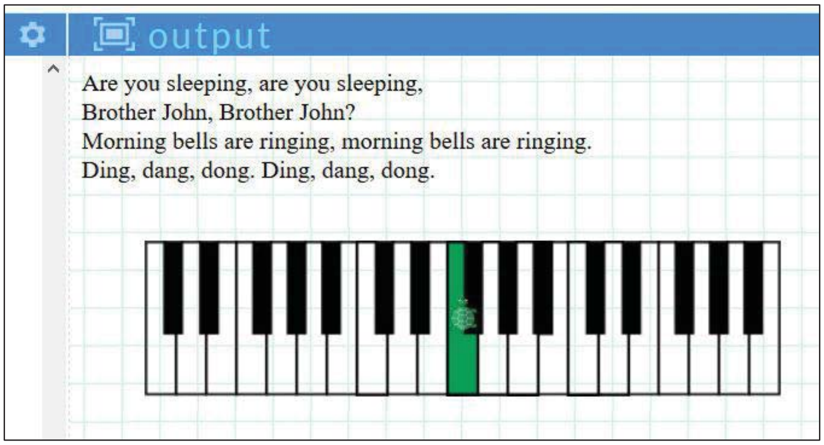
Using the SingSay Template — Example



```
%abc-2.1

X:1
T:ARE YOU SLEEPING
C:Traditional
C:Arranged by CATHERINE DELANOY
M:4/4
L:1/4
K:F
Q:150
F G A F | F G A F | \
w:Are you sleep-ing, are you sleep-ing,
A B C'2 | A B C'2 |
w:Broth-er John, Broth-er John?
C'/2D'/2C'/2B/2 A F | C'/2D'/2C'/2B/2 A F | \
w:Morn-ing bells are ring-ing, morn-ing bells are ring-ing.
F C F2 | F C F2 |]
w:Ding, dang, dong. Ding, dang, dong.
```


ARE YOU SLEEPING
Traditional
Arranged by CATHERINE DELANOY
♩= 150
Are you sleep - ing, are you sleep - ing, Broth - er John, Broth - er John?
Morn -ing bells are ring - ing, morn -ing bells are ring - ing. Ding, dang, dong. Ding, dang, dong.

```
# "Are you sleeping" lyrics
for k in [1..2]
  if k == 1
    singsay 1, "F", "Are"
  else
    singsay 1, "F", "are"
  singsay 1, "G", " you"
  singsay 1, "A", " sleep"
  singsay 1, "F", "ing, "

# "Brother John" lyrics
for k in [1..2]
  if k == 1
    singsay 1, "A", "|Broth"
  else
    singsay 1, "A", "Broth"
  singsay 1, "B", "er"
  if k == 1
    singsay 1, "C'2", " John, "
  else
    singsay 1, "C'2", " John?"

# "Morning bells are ringing" lyrics
for k in [1..2]
  if k == 1
    singsay 1, "C'/2", "|Morn"
  else
    singsay 1, "C'/2", " morn"
  singsay 1, "D'/2", "ing"
  singsay 1, "C'/2", " bells"
  singsay 1, "B/2", " are"
  singsay 1, "A", " ring"
  if k == 1
    singsay 1, "F", "ing,"
  else
    singsay 1, "F", "ing."

# "Ding, dang, dong" lyrics
for k in [1..2]
  if k == 1
    singsay 1, "F", "|Ding, "
  else
    singsay 1, "F", " Ding, "
  singsay 1, "C", "dang, "
  singsay 1, "F2", "dong."
```



```
Are you sleeping, are you sleeping,
Brother John, Brother John?
Morning bells are ringing, morning bells are ringing.
Ding, dang, dong. Ding, dang, dong.
```